

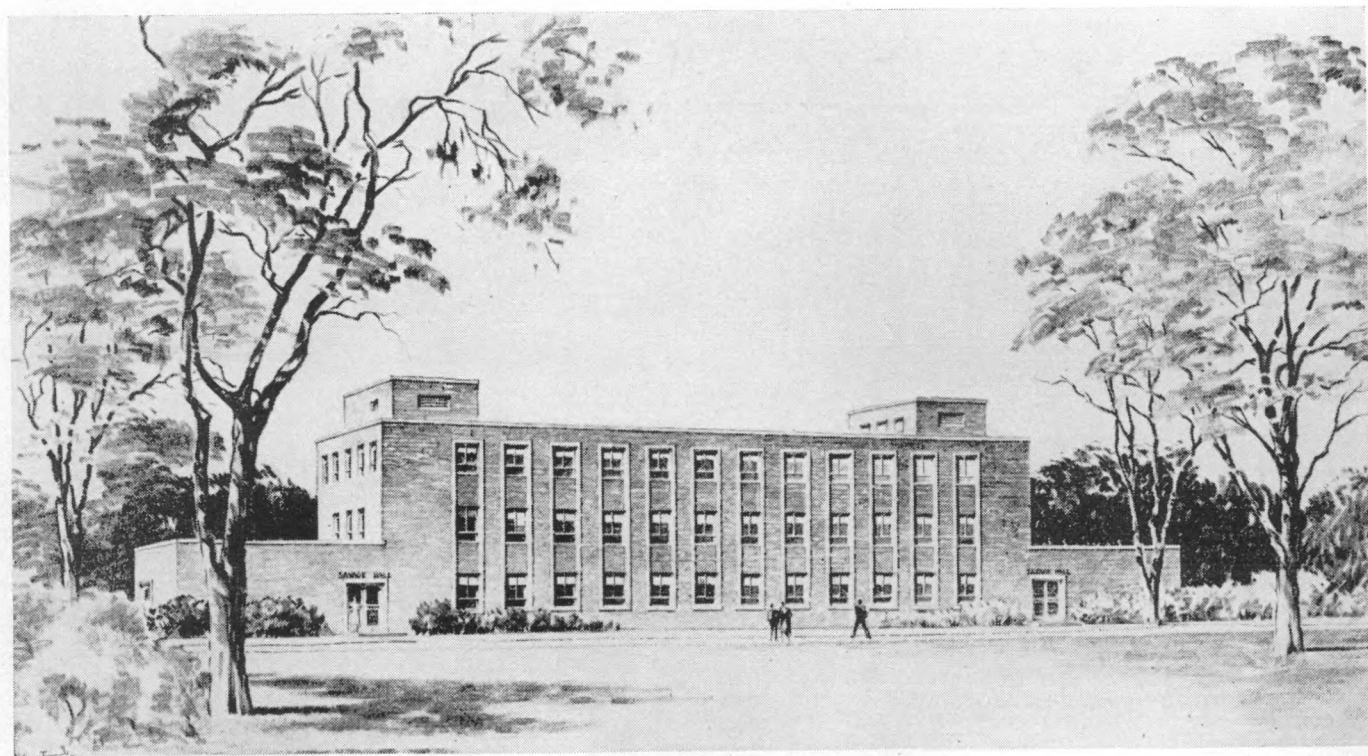
CORNELL UNIVERSITY
OFFICIAL PUBLICATION

School of Nutrition

1954-55

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Savage Hall, the home of the School of Nutrition

Faculty

ADMINISTRATION

Deane W. Malott, A.B., M.B.A., LL.D., *President of the University*
Forrest Frank Hill, Ph.D., LL.D., *Provost of the University*
Leonard Amby Maynard, Ph.D., D. Sc., *Director of the School*
Walter L. Nelson, Ph.D., *Secretary of the School*

INSTRUCTION AND RESEARCH

LeRoy Leshner Barnes, Ph.D., *Professor (Biophysics)*
Kenneth Crees Beeson, Ph.D., *Professor (Soil Science)*
Kathleen Kennan Berresford, M.S., *Assistant Professor (Public Health Nutrition)*
Alice Briant, Ph.D., *Associate Professor (Food and Nutrition)*
Walter Leighton Clark, Ph.D., *Assistant Professor (Food Science)*
Louise Jane Daniel, Ph.D., *Associate Professor (Biochemistry and Nutrition)*
Charles Douglas Darling, M.D., *Professor (Clinical Medicine)*
Herrell F. DeGraff, Ph.D., *Professor (Food Economics)*
Robert Watson Dougherty, D.V.M., *Professor (Veterinary Medicine)*
Joseph A. Dye, Ph.D., *Professor (Physiology)*
Frederick S. Erdman, Ph.D., *Professor (Mechanical Engineering)*
Faith Fenton, Ph.D., *Professor (Food and Nutrition)*
Grace Fiala, A.B., *Research Associate (Clinical Medicine)*
Jeffrey H. Fryer, M.D., *Assistant Professor (Clinical Medicine)*
Howard Merrill Giff, C.E., *Professor (Sanitary Engineering)*
Carl Edward Frederick Guterman, Ph.D., *Professor (Plant Pathology)*
David B. Hand, Ph.D., *Professor (Food Technology)*
Katharine Wyckoff Harris, M.A., *Professor (Institution Management)*
Hazel Marie Hauck, Ph.D., *Professor (Nutrition)*
Barbour L. Herrington, Ph.D., *Professor (Dairy Chemistry)*
Gustave Frederick Heuser, Ph.D., *Professor (Nutrition)*
Fredric William Hill, Ph.D., *Professor (Nutrition)*
Frances Ann Johnston, Ph.D., *Associate Professor (Food and Nutrition)*
Karla Longrée, Ph.D., *Associate Professor (Institution Management)*
John Kasper Loosli, Ph.D., *Professor (Animal Nutrition)*
Ruth N. Lutz, Ph.D., *Assistant Professor (Food and Nutrition)*
Leonard Amby Maynard, Ph.D., *Professor (Nutrition)*
Clive Maine McCay, Ph.D., *Professor (Nutrition)*
Norman Slawson Moore, M.D., *Professor (Clinical Medicine)*

- Yoshi Nakayama, M.S., *Research Assistant (Library)*
Walter Ludwig Nelson, Ph.D., *Professor (Biochemistry and Nutrition)*
Leo Chandler Norris, Ph.D., *Professor (Nutrition)*
Catherine Jane Personius, Ph.D., *Professor (Food and Nutrition)*
Milton Leonard Scott, Ph.D., *Professor (Nutrition)*
Harry Wilbur Seeley, Jr., Ph.D., *Professor (Bacteriology)*
Sedgwick Eugene Smith, Ph.D., *Professor (Nutrition)*
Grace Steininger, Ph.D., *Professor (Food and Nutrition)*
John Summerskill, Ph.D., *Assistant Professor (Medical Psychology)*
James Batcheller Sumner, Ph.D., *Professor (Biochemistry)*
Kenneth LeRoy Turk, Ph.D., *Professor (Animal Husbandry)*
Paul E. Waibel, Ph.D., *Research Associate (Nutrition)*
Herbert Frederick Wiegandt, Ph.D., *Associate Professor (Chemical Engineering)*
Harold Henderson Williams, Ph.D., *Professor (Biochemistry and Nutrition)*
Charlotte Marie Young, Ph.D., *Professor (Medical Nutrition)*

The School of Nutrition

THE School of Nutrition was established at Cornell University to meet the enlarged and diversified needs of the many fields, both academic and industrial, in which a thorough knowledge of food and nutrition and their underlying sciences has become of importance. The program of the School offers an opportunity for the study of problems in food technology and food economics and problems of food supply and distribution. Its curricula provide for the training of research workers and teachers in nutrition, both human and animal; nutritionists in public health and institutional work; and personnel for the food and feed industries.

ORGANIZATION AND FACILITIES

The School is an organization in which the various colleges of the University are cooperating to provide an integrated program of research and teaching in food and nutrition. It is administered by a board consisting of the President, the Provost, the Vice President for University Development, the Deans of the Colleges of Agriculture, Arts and Sciences, Engineering, Home Economics, and the Medical College, and the Director of the School. The School is supported by the endowed funds of the University, by an appropriation from the State University of New York, and by grants from various sources.

The School is housed in a new building, equipped for teaching and research in the various aspects of food and nutrition. The facilities include biochemical, microbiological, and food laboratories, air-conditioned rooms for small-animal studies, and several laboratories equipped for other specific purposes. In addition, well equipped laboratories and other facilities are available in the cooperating colleges for studies of both human and animal nutrition and of the food supplies concerned. The Department of Clinical and Preventive Medicine of the University offers opportunity for studying the clinical aspects of nutrition. The United States Plant, Soil, and Nutrition Laboratory, established at Cornell in 1939, provides unusual opportunities for studying the relation of the production and processing of food crops to their nutritive value.

CURRICULUM AND DEGREES

The School offers a two-year curriculum providing for specialization in either nutritional science or food science and leading to the degree of Master of Nutritional Science or Master of Food Science.

ADMISSION

To be admitted to the School the applicant must hold a baccalaureate degree from a college or university of recognized standing or have done work equivalent to that required for such a degree, except that admission is open to Cornell undergraduates who can otherwise qualify at the end of their third year and for whom a combined curriculum can be planned which will enable them to receive the Bachelor's degree in their colleges and simultaneously complete the first year's work of the School. The applicant must have a definite professional interest in the field of nutrition. His training must have included the completion, with a superior record, of courses in the following subjects, with the approximate number of semester hours as stated:

Physical sciences—20 hours. (Chemistry, physics, mathematics.) Courses in quantitative chemistry and organic chemistry are prerequisites to courses required for graduation. If they are not offered for entrance, they must be taken following admission. Students who enter without training in physics are required to take an elementary course in this subject before graduation. Beginning courses in physics and chemistry, including organic and quantitative, cannot be counted toward graduation.

Biological sciences—12 hours. (Biology, botany, or zoology; bacteriology; physiology.) Courses in animal or human nutrition, or in food science up to three hours may be counted in the biological sciences. Students who enter without bacteriology or physiology are required to take an elementary course in this subject before graduation. Beginning courses in bacteriology or physiology cannot be counted toward graduation. An elementary course in bacteriology is a prerequisite to courses required for the degree of Master of Food Science.

Social studies—9 hours. Suggested subjects are economics, government, education, psychology, sociology, anthropology, and history.

In addition, the applicant's record must show evidence that he has satisfactorily completed other courses which would be prerequisite to those he would need to take as a candidate for the degree for which he wishes to register. An applicant who cannot meet in full the specific course requirements listed above may be admitted if the Committee on Admissions and Counseling of the School so recommends after a consideration of his case, but with the understanding that the deficiencies must be made up before graduation.

An applicant who enters with the Bachelor's degree and who can meet the full requirements for admission and, in addition, has taken certain courses that are considered fully equivalent to certain ones specified as required for graduation, or that his faculty adviser might consider to satisfy the requirements for approved electives, may be given advanced standing upon recommendation of the Committee on Admissions and Counseling.

Admission as special students is open to applicants who desire to reg-

ister for a term or more to take specific courses but who do not wish to become candidates for a degree. Such applicants must hold Bachelors' degrees, meet the other requirements specified for admission, and show evidence that the courses desired will be of special benefit to them in their professional careers.

Students not previously registered at Cornell University must meet the general requirements for admission to the University as set forth in its *General Information Announcement*. These include the following medical requirements: (1) Every student matriculating in the University must present a certificate of vaccination against smallpox showing a successful vaccination within five years or at least three unsuccessful attempts in that period. (2) Every student is required to have a chest X-ray film on permanent file at the Infirmary. A chest radiograph may be made during the orientation period or registration week; a charge of \$2 for making it is included in the University fees. Or the radiograph may be made by a private physician within a month of entrance and presented to the Clinical Director at the time of registration. When a student has been away from the University for any reason for a year or more, he or she must have another X-ray upon re-entrance, for which the student will be billed. (3) Accepted students will be required to fill out health record forms.

All students admitted to the School must also register with the Registrar of the University at the beginning of each term or session. Students wishing to register for the degree of Doctor of Philosophy with a major in nutrition should apply to the Graduate School, which has exclusive jurisdiction over this degree.*

Inquiries about admission should be addressed to the office of the School of Nutrition, Cornell University, Ithaca, New York. An application for admission should be made upon the form supplied by the office of the School. No application will be acted upon until all credentials enumerated in this form have been filed.

REQUIREMENTS FOR GRADUATION

Each student's program is carried out under the guidance of a faculty adviser. The requirements for graduation call for the completion of sixty semester hours, including the preparation of a written report on an approved problem, which may or may not require laboratory research. The two-year course differs in accordance with the field in which the student wishes to specialize, as follows:

A. *Nutritional Science*. The specialized training in this field, leading to the degree of Master of Nutritional Science, emphasizes the scientific knowledge and techniques underlying nutrition. The completion of the following curriculum is required:

*Candidates for this degree who are majoring in nutrition may become informally affiliated with the School of Nutrition, if they so desire, provided they can meet its entrance requirements.

	<i>Hours</i>		<i>Hours</i>
General Biochemistry	6	History of Nutrition	1
Principles of Nutrition	3	Seminars	1
Laboratory work in		Advanced course in human	
nutrition	3	or animal nutrition	3
Physiology	6	Report on individual	
Food Economics	3	problem	6-10
Statistics (Biometry)	3	Approved electives	25-21

The electives will be those approved by the faculty adviser as being appropriate for rounding out the student's training in the field of nutritional science.

B. *Food Science*. The specialized training in this field, leading to the degree of Master of Food Science, emphasizes the sciences involved in food processing and utilization. The completion of the following curriculum is required:

	<i>Hours</i>		<i>Hours</i>
General Biochemistry	6	Advanced course in nutrition	3
Advanced Bacteriology	6	Seminars	1
Advanced course in foods	8	Report on individual	
Food Economics	3	problem	6-10
Statistics (Biometry)	3	Approved electives	24-20

The electives will be those approved by the faculty adviser as being appropriate for rounding out the student's training in the field of food science.

The work involved in the report on an individual problem, required for both degrees, may be carried out, with the approval of the student's faculty adviser, under the direction of any member of the faculty of the School whom the student may choose and who is willing to supervise it. The original copy of this report should be submitted to the office of the Secretary of the School of Nutrition, after approval by the faculty adviser, at least one week prior to the beginning of the final examination period. Directions concerning the form in which the report is to be presented may be obtained either from the student's faculty adviser or the office of the Secretary of the School of Nutrition.

TRAINING FOR SPECIALIZED FIELDS

The provision for approved electives in the curricula for the two degrees enables the student, under the guidance of his faculty adviser, to prepare himself for one of several specialized fields in the general area in which the School operates. Students who wish to prepare themselves for teaching or research are given training in the principles governing the nutrition of all species, and they also have the opportunity, through an appropriate choice of electives, to learn how to apply these principles in either human or animal nutrition.

Special opportunities are provided for students of appropriate background who are interested in preparing themselves for work as nutritionists with health and welfare agencies. Here the approved electives will include certain phases of social science, the elements of public health, and appropriate informational service techniques. Opportunities for supervised experiences with health agencies are available for selected students. Suitable students are urged to spend a portion of the summer in "in-service" training in nutrition as applied to public health. Help will be given in making the necessary contacts. These opportunities will provide assignments which can be used as the basis for meeting the requirement for a report on an individual problem.

Students who desire to prepare themselves for positions in the food industry will receive training in the sciences fundamental to work in food production and processing, quality control, and industrial research and development. The special training will emphasize biochemistry, bacteriology, and engineering and their applications in food processing and preservation. Opportunity will be provided for studies in economics, marketing, and business administration to round out the basic needs of the student for a professional career. It is also hoped that the student will gain practical experience in a food-processing establishment prior to the completion of his studies.

Students who desire to prepare for positions in the feed industry should have completed, prior to admission, reasonably broad training in livestock production, including poultry. They will receive in the School special training in the sciences which are fundamental to the work dealing with the formulation of rations for animals, the analysis of feedstuffs, and the conduct of experimental work. The training will stress principles of animal nutrition, experimental methods in animal nutrition, animal physiology, bacteriology, and analytical procedures. In order to round out the training of the student, courses in food economics, marketing, and business administration are provided. The student will be encouraged to obtain practical experience in a feed-manufacturing plant before completing his studies for the degree.

RESIDENCE REQUIREMENTS

No student may receive a degree from the School who has not completed two terms of residence after receiving the Bachelor's degree from Cornell or elsewhere. Students holding Bachelors' degrees may be considered for advanced standing, as previously mentioned. Those who do not receive advanced standing must expect to spend three to four terms to complete the requirements. A student who holds a teaching or research assistantship involving a significant loss of time from his course work will not be given full residence credit. Assistants whose duties call for approximately twenty hours of work weekly will receive only three-fourths of residence credit a term. In other cases the amount of deduction will be determined by the Committee on Admissions and Counseling.

CREDIT FOR WORK DONE IN THE SUMMER

A student who is registered in the School may receive credit for work done in the University Summer Session if his program is approved in advance by his faculty adviser. To receive this credit he must also be registered in the Summer Session.

A student who has been registered in the School for one term after receiving his Bachelor's degree may, with the approval of his faculty adviser, register for a minimum of four and a maximum of twelve weeks for work on his individual problem under personal direction of a member of the faculty of the School and thus earn four to twelve weeks of residence credit. The student can thus make use of the summer period to meet, in whole or in part, the requirements of ten credit hours which are granted upon the completion of his report on an approved problem. A student who is registered in the School for work under personal direction must also register with the Registrar of the University.

TUITION AND FEES

A registration deposit of \$28 must be made by every applicant accepted for admission unless the candidate has previously matriculated as a student at Cornell University. A check or money order payable to Cornell University should be remitted to the School of Nutrition upon notification of acceptance by the School. This deposit is used to pay the matriculation fee, chest X-ray, and examination blank charge and covers certain expenses incident to graduation if the student receives a degree.

A tuition fee of \$225 a term is to be paid by all students registered in the School except that those students jointly registered in one of the undergraduate colleges will pay the tuition of that college.

A composite fee (College and University General fee) of \$67.50 a term is required of each single registrant in the School. This fee covers the following services: administration, laboratory and library, health and infirmary, physical education and recreation, and student union.

Students of the School who attend classes in the Summer Session must register both in the School and in the Summer Session and pay the tuition and other fees required by the Summer Session.

A student working under personal direction in the School of Nutrition for twelve weeks (the maximum amount of residence credit which can be earned), or less, during the summer must pay a tuition fee of \$14.0625 a week of residence credit. He must also pay a composite fee of \$67.50 for the twelve-week period, or one-half of this fee if registered for eight weeks or less.

FELLOWSHIPS, ASSISTANTSHIPS, AND SCHOLARSHIPS

The School of Nutrition has a limited number of fellowships, assistantships, and tuition-free scholarships to which appointments for the following year are usually made during the spring term. Applications

for these fellowships, assistantships, and scholarships should be made to the office of the School of Nutrition not later than March 1.

ADVISORY SERVICE FOR STUDENTS PREPARING AT CORNELL TO ENTER THE SCHOOL

Students who prepare for admission to the School of Nutrition in the Colleges of Agriculture, Arts and Sciences, or Home Economics at Cornell University are advised during the period of preparation by members of the faculty of the School who are also members of the faculty of the college in which the students matriculate.

Undergraduates interested in nutrition who are matriculating at Cornell University for the first time should state upon the application for admission that the business or profession (field of work) which they expect to enter upon completion of their studies is nutrition. This is necessary in order that appropriate faculty advisers may be assigned to them.

HEALTH SERVICES AND MEDICAL CARE

These services are centered in the University Clinic or out-patient department and in the Cornell Infirmary or hospital. Students are entitled to unlimited visits at the Clinic; laboratory and X-ray examinations indicated for diagnosis and treatment; hospitalization in the Infirmary with medical care for a maximum of fourteen days each term; and emergency surgical care. The cost for these services is included in the College and University general fee. For further details, including charges for special services, see the *General Information Announcement*.

Description of Courses

THE following list of courses includes both those previously specified as required for the degrees offered and those from which electives may be selected, with the approval of the student's faculty adviser, in accordance with his specific field of interest.

The information in parentheses following the name and the course refers to the college in which the course is given, the department, and the course number. In registering for any of these courses the information shown in the parentheses should be given rather than the name of the course. In some instances the time and place are not given in the descriptive material enclosed in the parentheses following the title of the course. To obtain this information the student should consult the specific departmental office or special Announcements issued by the colleges concerned.

NUTRITION

PRINCIPLES OF ANIMAL NUTRITION. (Agriculture; Animal Husbandry 110.) Fall. Credit three hours. For seniors and graduate students. Prerequisite, a course in human or veterinary physiology and a course in organic chemistry or biochemistry. Lectures, M W F 10. Savage 100. Professor LOOSLI.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

LABORATORY WORK IN ANIMAL NUTRITION. (Agriculture; Animal Husbandry 111.) Fall. Credit three hours. Prerequisite, quantitative analysis. M W F 2-4:20. Stocking 160. Professor McCAY.

Each student engages in a series of small research projects with living animals, such as rats, dogs, and other animals, where both classical techniques, such as chemical balance studies, and very modern ones are taught. The use of animals and the application of biochemical methods in advancing the science of nutrition are included.

NUTRITION. (Home Economics; Food and Nutrition 230.) Spring. Credit three hours. Prerequisites, elementary college courses in nutrition, biochemistry, and human physiology (for Home Economics students: Food and Nutrition 103, Human Physiology 303, or Zoology 201, and Biochemistry 10; other students should see the instructor about equivalent preparation). Discussion, T Th 8, Van Rensselaer 339. Laboratory, F 2-4 or S 9-11, Van Rensselaer 426. Professors HAUCK and NEWMAN.

Principles of nutrition as they relate to energy metabolism and weight control, hygiene of the digestive tract, proteins, minerals, and vitamins. Application of the principles of nutrition to needs of normal individuals. During and as a result of this course the student is expected to establish and maintain good nutrition practices.

MATERNAL AND CHILD NUTRITION. (Home Economics; Food and Nutrition 340.) Fall and spring. Credit two hours. Prerequisite, Food and Nutrition

103 or 190. Not open to students who take Food and Nutrition 230. Lecture and discussion, W F 8. Van Rensselaer 339. Professor NEWMAN.

Family nutrition with special emphasis upon the nutritional needs of the mother and child. Relation of nutrition to physical growth and development.

NUTRITION OF GROWTH AND DEVELOPMENT. (Home Economics; Food and Nutrition 440.) Spring. Credit two hours. Prerequisite, Food and Nutrition 230 or equivalent. T Th 11. Van Rensselaer 301. Professor STEININGER.

Relation of nutrition to growth and development from the prenatal period to adulthood. A study of research literature.

HISTORY OF NUTRITION. (Agriculture; Animal Husbandry 215.) Fall. Credit one hour. Th 4:15. Savage 130. Professor McCAY.

The purpose of the course is to familiarize the student with the background literature in nutrition and to improve his technique in using the libraries. Each student prepares four written reports and summarizes these in brief oral reports to learn better ways to present technical information.

SPECIAL TOPICS IN NUTRITION. (Agriculture; Biochemistry and Nutrition 220.) Spring. Credit one hour. Primarily for graduate students. Prerequisite, a course in biochemistry and a course in nutrition. Registration by permission. T 8. Savage 145. Professor MAYNARD and Professor WILLIAMS.

ADVANCED POULTRY NUTRITION. (Agriculture; Poultry Husbandry 210.) Spring. Credit two hours. For graduate students. Not given every year and not unless ten or more students apply for the course. Registration by appointment. Discussion and laboratory period, Th 2-4. Rice 201. Professor NORRIS and Professor SCOTT.

A presentation of one or more important fields of research in poultry nutrition, a critical consideration of the experimental methods used in conducting the investigations, and a discussion of further studies needed, including the planning of the experiments.

READINGS IN NUTRITION. (Home Economics; Food and Nutrition 400.) Fall. Offered in alternate years. Credit two hours. Instructor's signature required at preregistration. Discussion, T Th 9. Van Rensselaer 301. Professor HAUCK.

Critical review of literature in the field of vitamin and mineral metabolism, with emphasis on the experimental data on which the principles of human nutrition are based.

[**READINGS IN NUTRITION.** (Home Economics; Food and Nutrition 401.) Fall. Offered in alternate years. Credit two hours. Instructor's signature required at preregistration. T Th 9. Van Rensselaer 301. Professor HAUCK.

Critical review of literature relating to energy metabolism, proteins, fats, and carbohydrates, with emphasis on the experimental data on which the principles of human nutrition are based. Not offered in 1954-55.]

SEMINAR IN ANIMAL NUTRITION. (Agriculture; Animal Husbandry 219.) Fall. Credit one hour. Open to graduate students with major field of study in animal nutrition. Registration by permission. T 4:30. Rice 201. Animal Nutrition staff.

A critical review of the literature and other topics of special interest to graduate students in animal nutrition.

NUTRITION SEMINAR. (Agriculture; Biochemistry and Nutrition 292.) Spring. Credit one hour. Registration by permission. M 4:15. Savage 100. Professor MAYNARD and staff.

Assignments and discussions of recent advances in the biochemistry and physiology of nutrition.

SEMINAR IN FOOD AND NUTRITION. (Home Economics; Food and Nutrition 360.) Fall. Credit one hour. Prerequisite, Food and Nutrition 215 or 225. Th 2. Van Rensselaer 301. Professors FENTON and NEWMAN.

Study of historical and current literature. One half of the semester is devoted to food science and one half to the nutrition field.

ADVANCED SEMINAR IN NUTRITION. (Home Economics; Food and Nutrition 420.) Fall. Credit one hour. T 4:30. Van Rensselaer 301. Professor STEINGER and department staff.

CLINICAL AND PUBLIC HEALTH NUTRITION. (Clinical and Preventive Medicine 392.) Spring. Credit two hours. Prerequisites, a course in nutrition, in physiology, and in biochemistry. Registration by permission of the instructor. For School of Nutrition and Graduate School students only. T Th 12. Savage 145. Professor YOUNG and members of the medical staff.

This course is designed to familiarize the student with some of the applications of nutrition to clinical problems.

FIELD OBSERVATION AND EXPERIENCE IN COMMUNITY NUTRITION. (Clinical and Preventive Medicine 381-382.) Both terms. Credit two hours (a term). Prerequisite, consent of the instructor. For School of Nutrition and Graduate School students only. Two half-days a week. Time and place as arranged. Assistant Professor BERRESFORD.

Supervised observation and experiences in the community nutrition program of a county health unit. Supervision is provided by a qualified nutritionist.

PUBLIC HEALTH NUTRITION TECHNIQUES. (Clinical and Preventive Medicine 376.) Spring. Credit one hour. Registration by permission. For School of Nutrition and graduate students only. Time and place as arranged. Savage. Assistant Professor BERRESFORD.

A discussion of the function of the public health nutritionist in official and voluntary agencies at the national, state, and local level and a study of various techniques employed in executing a nutrition program, such as low-cost budgeting, racial diet patterns, interviewing, evaluation and preparation of education materials and visual aids, clinic procedures, consultation to institutions, and nutrition education in schools.

DIET THERAPY. (Home Economics; Food and Nutrition 330.) Fall. Credit three hours. Prerequisite, Food and Nutrition 230 or equivalent. Registration with permission. Lecture and discussion, M W F 9. Van Rensselaer 426. Professor HAUCK.

Diet in diseases such as fever, gastrointestinal disturbances, and diabetes. Experience in independent use of journal literature in this field.

NUTRITION AND HEALTH. (Home Economics; Food and Nutrition 190.) Spring. Credit two hours. Intended for students who have had no previous college course in human nutrition. Not to be elected by students who take Food and Nutrition 103 or 104. W F 8. Van Rensselaer 426. Professor HAUCK.

The relationship of food to the maintenance of health; its importance to the individual and society.

LIVESTOCK FEEDING. (Agriculture; Animal Husbandry 10.) Fall or spring. Credit four hours. Prerequisite, Chemistry 101, 105, or Biochemistry 2. Lectures: fall term, M W F 11; spring term, M W F 9; Wing A. Laboratory; fall term, Th or F, 2-4:20, Wing A; spring term, M W Th or F, 2-4:20, Wing C. Professor S. E. SMITH, Assistant Professor WARNER, and assistants.

The feeding of farm animals, including the general basic principles, feeding standards, the computation of rations, and the composition and nutritive value of livestock feeds. (Acceptable for meeting entrance requirements in nutrition for School of Nutrition students.)

PUBLIC HEALTH

PUBLIC HEALTH AND COMMUNITY SANITATION. (Engineering 2509.) Spring. Credit three hours. Elective for advanced and graduate students in civil

engineering and students outside the School by permission of the instructor. Three recitations or lectures a week. M W F 9.

A general course outlining basic principles in transmission of disease and communicable disease control; organizations and functions of federal, state, and local health departments; standards of environmental sanitation, including water supply, waste disposal, milk, restaurant and school sanitation, insect and rodent control; industrial hygiene; vital statistics. Content of the course adjusted to the needs of the students enrolled in order to demonstrate the responsibility of individuals and their professions for maintaining the public health.

FOOD PROCESSING

PRINCIPLES OF FOOD PRESERVATION. (Agriculture; Biochemistry and Nutrition 130.) Spring. Credit two hours. Prerequisite, biochemistry or organic chemistry. Lectures, T Th 10. Savage 145. Assistant Professor CLARK.

A discussion of the basic physical, chemical, and biological principles of food preservation and their application in refining, dehydration, cold storage, freezing, canning, fermentation, chemical preservation, and packaging. The effects of food processing upon the maintenance of nutritive value and on other food qualities.

SELECTED TOPICS IN FOOD BIOCHEMISTRY. (Agriculture; Biochemistry and Nutrition 140.) Spring. Credit two hours. Prerequisite, Biochemistry 101. Lectures, M W 10. Savage 145. Assistant Professor CLARK.

A discussion of some of the important nonmicrobial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes as they affect the color, odor, flavor, texture, or nutritive value of foods.

FOOD BIOCHEMISTRY SEMINAR. (Agriculture; Biochemistry and Nutrition 294.) Fall. Credit one hour. Registration by permission. T 4:30. Savage 130. Assistant Professor CLARK.

Assignments and discussions of literature pertaining to the biochemical aspects of food and food processing.

ENGINEERING IN FOOD PROCESSING. (Engineering 3510.) Fall. Credit three hours. Prerequisite, college physics and chemistry. Primarily for students in the College of Agriculture and School of Nutrition. Not open to engineering students. Lecture-recitations T Th S 9. Warren 245. Professor ERDMAN.

An introduction to engineering principles of construction and operation of mechanical and electrical equipment used in the preservation and storage of foods.

ELEMENTARY CHEMICAL ENGINEERING. (Engineering 5110.) Spring. Credit three hours. Prerequisite, Engineering 3510. Primarily for students in agriculture or nutrition. Not open to students in chemical engineering. Lectures, M W F 11. Olin 158. Associate Professor WIEGANDT.

A general discussion of the fundamental operations and processes of chemical engineering, with particular emphasis on their applications in the food-processing industries. Among the topics discussed are the unit operations of evaporation, filtration, agitation, distillation, and drying, and the general design of food-processing plants.

METHODS ENGINEERING. (Mechanical Engineering 3262.) Fall or spring. Credit three hours. One lecture and two laboratory periods a week. Prerequisite, Mechanical Engineering 3235 or 3236.

A study of the factors influencing the productivity and economy of industrial operations and related jobs. This includes the charting and analysis of problems of work flow in industry; the coordination of man time and machine time in manufacturing operations; the principles of motion economy and micromotion analysis; the theory and practice of time study for setting operational standards through watch studies, standard data, and elemental motion standards; and in-

centive systems for direct and indirect labor jobs. Emphasis is placed on personnel and human relations problems associated with methods improvements and incentive systems.

ANALYTICAL METHODS. (Agriculture; Dairy Industry 111.) Spring. Credit four hours. Prerequisite, quantitative analysis. Lectures, T Th 11. Laboratory practice, T 1-5. Stocking 120. Professor HERRINGTON and assistant.

A study of the more important operations and apparatus used in quantitative analysis and their practical application.

CHEMISTRY OF MILK. (Agriculture; Dairy Industry 113.) Fall. Credit two hours. Prerequisite, qualitative and quantitative analysis and organic chemistry. Lectures, M W 8. Stocking 120. Professor HERRINGTON and Associate Professor SHIPE.

The subject matter changes from year to year. It may deal with colloidal phenomena in milk and its products. It may deal with the enzymes of milk, with milk proteins, with milk fat, or with chemical reactions and equilibria in dairy products. Graduate students may reregister in successive years and find little duplication of material.

MILK-PRODUCTS MANUFACTURING. (Agriculture; Dairy Industry 103.) Fall. Credit five hours. Prerequisite, Dairy Industry 1, Bacteriology 1, and organic chemistry. T Th 11-4:30. Stocking 120. Associate Professor KOSIKOWSKY and assistant.

The principles and practice of making butter, cheese, and casein, including a study of the physical, chemical, and biological factors involved. Consideration is given also to commercial operations and dairy-plant management.

MILK-PRODUCTS MANUFACTURING. (Agriculture; Dairy Industry 104.) Spring. Credit five hours. Prerequisite, Dairy Industry 102. T Th 11-4:30. Stocking 119. Assistant Professor JORDAN and assistant.

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved.

HANDLING, STORAGE, AND UTILIZATION OF FRUIT. (Agriculture; Pomology 111.) Fall. Credit three hours. Prerequisite, Pomology 1. Lectures, T Th 8; Plant Science 143. Laboratory, Th or F 2-4:30; Plant Science 107. Professor SMOCK.

The important factors in handling fruit that affect quality and marketability, including the chemistry and physiology of fruits before and after harvest, are studied. The effect of grades and packages on distribution and marketing is fully discussed, with some attention to the problems of market inspection. Consideration is given to the principles and practices of common, cold, and controlled atmospheric storage, and to the utilization of fruits in the dried, canned, frozen, or juice forms. One Saturday field trip is required.

HANDLING VEGETABLE CROPS, ADVANCED COURSE. (Agriculture; Vegetable Crops 112.) Fall. Credit four hours. Primarily for graduate students and those undergraduates who are specializing in marketing. Lectures, T Th 11; East Roberts 222. Laboratory, T or W 2-4:30; East Roberts 223. One-hour conference period, to be arranged. Professor HARTMAN.

This course has the same lectures, laboratories and field trips as Vegetable Crops 12. Much more outside reading of research publications in the field is required in Vegetable Crops 112 than in Vegetable Crops 12, and different examinations are given for the two courses.

[RESEARCH METHODS IN VEGETABLE CROPS. (Agriculture; Vegetable Crops 225.) Spring. Credit four hours. Primarily for graduate students. Prerequisite, Vegetable Crops 101. It is recommended that Botany 231 and 232 precede or accompany this course. Associate Professor KELLY and Professor JACOB.

A study of research techniques peculiar to vegetable crops, with a study of the literature and the solution of research problems. Not given in 1954-55.]

VEGETABLE CROPS, ADVANCED COURSE. (Agriculture; Vegetable Crops 101.) Fall. Credit four hours. Prerequisite, Vegetable Crops 11 and Botany 31. Lectures, M W F 11. Laboratory, M 2-4:30. East Roberts 223. Professor JACOB.

A course devoted to a systematic study of the literature dealing with practices in vegetable production. Results of experiments that have been concluded or are being conducted are studied, and their application to the solution of practical problems is discussed.

FOOD PREPARATION

SCIENCE IN FOOD PREPARATION. (Home Economics; Food and Nutrition 314.) Fall. Credit three hours. Prerequisite, Food and Nutrition 215 or 225 and Biochemistry 10. Registration with permission. Lecture T Th 8; Van Rensselaer 339. Laboratory S 9-11; Van Rensselaer 356 and 358. Professor PERSONIUS.

Study of scientific principles underlying modern theory and practice in the preparation of batters, doughs, and starch-thickened products and in egg and milk cookery. The relation to food preparation of the physical and chemical properties of fats, proteins, starches and leavening agents; colloidal systems—gels, sols, foams, and emulsions. Laboratory studies of effect of varying ingredients, manipulation, and cooking conditions on quality of the product.

SCIENCE IN FOOD PREPARATION. INTRODUCTORY EXPERIMENTAL COOKERY. (Home Economics; Food and Nutrition 315.) Spring. Credit three hours. Prerequisite, Food and Nutrition 314, or equivalent. Registration with permission. Lecture T Th 9; Van Rensselaer 339. Laboratory F 10-1; Van Rensselaer 358. Professor FENTON.

Continuation of Food and Nutrition 314 with emphasis on meat, fruit, vegetable, and sugar cookery, and frozen desserts. The relation to food preparation of the physical and chemical properties of sugars, fruit and vegetable pigments and flavor constituents; properties of true solutions—solubility, boiling and freezing point, crystallization, palatability and retention of nutrients. Study of methods and techniques used in experimental work in food. Laboratories during the latter half of the semester will be devoted to independent work on a problem in food preparation.

ADVANCED EXPERIMENTAL COOKERY. (Home Economics; Food and Nutrition 414.) Fall. Credit three hours. Prerequisite, Food and Nutrition 315 or equivalent. Instructor's signature required at preregistration. Laboratory T Th 10-1. Van Rensselaer 358. Professor —.

A study of the objectives, methods, and results of food research. Objective and subjective experimental techniques used in measuring the quality of food. Independent laboratory work on problems in food preparation.

FOOD DEMONSTRATIONS. (Home Economics; Food and Nutrition 305.) Fall and spring. Credit one hour. Limited to 10 students. Prerequisite, Food and Nutrition 215 or 225. Registration with permission. T Th 2:30-4. Van Rensselaer 352. Associate Professor FOSTER.

Emphasis on the purposes and techniques of demonstrations in relation to food preparation and nutrition, with application to teaching, extension, business, and social service.

ADVANCED SEMINAR IN FOOD. (Home Economics; Food and Nutrition 421.) Spring. Credit one hour. T 4:30. Van Rensselaer 301. Professor PERSONIUS and department staff.

BACTERIOLOGY

ADVANCED BACTERIOLOGY. (Agriculture; Bacteriology 103.) Spring. Credit six hours. Prerequisite, Bacteriology 1, quantitative analysis, and organic chemistry.

Lectures and laboratory practice, M W F 2-5:30. Stocking 119. Professor SEELEY and assistants.

A systematic study of the important groups of bacteria that are of significance in water, milk, foods, and industry, together with the methods used in these fields of bacteriology.

HIGHER BACTERIA AND RELATED MICROORGANISMS. (Agriculture; Bacteriology 105.) Fall. Credit four hours. Prerequisite, Bacteriology 1. Lectures, recitations, and laboratory practice, T Th 1:40-5. Stocking 119 and 323. Professor KNAYSI and assistant.

A study of the higher bacteria, together with the yeast and molds that are of especial importance to the bacteriologist.

PHYSIOLOGY OF BACTERIA. (Agriculture; Bacteriology 210.) Fall. Credit two hours. Prerequisite, Bacteriology 1 and at least one additional course in bacteriology and one in organic chemistry. Lectures, T Th 10. Stocking 120. Associate Professor DELWICHE.

The physiology of bacteria and the biochemistry of microbic processes.

MORPHOLOGY AND CYTOLOGY OF BACTERIA. (Agriculture; Bacteriology 213.) Fall. Credit three hours. For seniors and graduate students. Lectures, T Th S 9. Stocking 119. Professor KNAYSI.

The morphology, cytology, and microchemistry of microorganisms.

CHEMISTRY OF BACTERIAL PROCESSES. (Agriculture; Bacteriology 215.) Spring. Credit two hours. For seniors and graduate students. Lectures, M W 11. Stocking 119. Associate Professor DELWICHE.

The chemistry of metabolism, fermentation, and nutrition of microorganisms.

BIOCHEMISTRY

GENERAL BIOCHEMISTRY, LECTURE. (Agriculture; Biochemistry and Nutrition 101.) Fall. Credit four hours. Prerequisites, Chemistry 215, or the equivalent; and 303 and 305 or the equivalent. Lectures, M W F S 11. Savage 100. Professor WILLIAMS.

For graduate and advanced undergraduate students, dealing with the chemistry of plant and animal substances and the reactions occurring in biological systems.

GENERAL BIOCHEMISTRY, LABORATORY. (Agriculture; Biochemistry and Nutrition 102.) Fall. Credit two hours. Prerequisite or parallel, Biochemistry and Nutrition 101. Laboratory, M W or T Th 2-4:20. Savage 230. Professor WILLIAMS and assistants.

Laboratory practice with plant and animal materials and the experimental study of their properties.

BIOCHEMISTRY AND NUTRITION OF THE VITAMINS. (Agriculture; Biochemistry and Nutrition 150.) Spring. Credit two hours. Given in alternate years. Prerequisite, Chemistry 303 and 305 or the equivalent, Biochemistry and Nutrition 101 or the equivalent, or Biochemistry and Nutrition 5 or 10 by permission. Lectures T Th 10. Savage 100. Associate Professor DANIEL.

Primarily for graduate students, dealing with the chemical, physiological, and nutritional aspects of the vitamins.

BIOCHEMISTRY OF LIPIDS AND CARBOHYDRATES. (Agriculture; Biochemistry and Nutrition 201.) Spring. Credit two hours. Prerequisite, Biochemistry and Nutrition 101 and 102, and Physical Chemistry 405 and 406, or the equivalent. Lectures, M W 9, Savage 100. Professor SUMNER and Professor NELSON.

Discussion of the properties and biological role of the lipids and carbohydrates.

BIOCHEMISTRY OF PROTEINS AND ENZYMES. (Agriculture; Biochemistry and Nutrition 202.) Spring. Credit two hours. Prerequisite, Biochemistry and

Nutrition 101 and 102, and Physical Chemistry 405 and 406, or the equivalent. Lectures, T Th 9. Savage 100. Professor SUMNER.

Discussion of the properties and biological role of proteins and enzymes.

ADVANCED BIOCHEMISTRY. Laboratory. (Agriculture; Biochemistry and Nutrition 203.) Spring. Credit three hours. Prerequisite, to accompany or follow Biochemistry and Nutrition 201 and 202. Limited enrollment. Registration by permission of the instructor only. M W 2-5. Savage 230. Professor SUMNER and Professor NELSON.

Laboratory experiments dealing with enzymes, cofactors, and substrates of importance in metabolic processes. Practice is given in the use of special techniques employed in isolation, characterization, and mode of action of enzymes and enzyme systems. Emphasis is placed on interpretation of data and written reports covering the various experiments.

[**PLANT BIOCHEMISTRY.** (Agriculture; Biochemistry and Nutrition 210.) Spring. Credit two hours. Prerequisite, Biochemistry and Nutrition 101 and 102 or the equivalent. Lectures, T Th 11. Savage 145. Associate Professor NEAL. Given in alternate years.

Lectures and discussion of biochemical topics of particular interest to students in plant sciences. Not given in 1954-55.]

BIOCHEMISTRY SEMINAR. (Agriculture; Biochemistry and Nutrition 290.) Fall. Credit one hour. Required of majors and minors. Prerequisite, Biochemistry and Nutrition 201 and 202 or the equivalent. Registration by permission. M 4:15. Savage 100. Professor SUMNER and staff.

Assignments and discussions of recent advances in biochemistry.

CHEMISTRY AND PHYSICS

CHEMISTRY OF NATURAL PRODUCTS. (Arts and Sciences; Chemistry 395-396.) Throughout the year. Credit two hours a term. Prerequisite, Chemistry 320 or 365-366. Primarily for graduate students. Open to undergraduates by consent of the instructor. Students may register for either term separately. Lectures, T Th 9. Mr. PHILLIPS. Given in alternate years.

A discussion of the organic chemistry of natural products. Fall: alkaloids, terpenes, antibiotics, and plant pigments. Spring: proteins, carbohydrates, vitamins, and steroids.

INTRODUCTORY PHYSICAL CHEMISTRY. (Arts and Sciences; Chemistry 403-404.) Throughout the year. Credit three hours a term. Prerequisite, Chemistry 224 and 308. Mathematics 163 or 193, and Physics 118. Chemistry 403 is prerequisite to Chemistry 404. Required of candidates for the degree of B.Ch.E. Lectures, M W F 9. Assistant Professor SCHERAGA.

A systematic treatment of the fundamental principles of physical chemistry. The laws of thermodynamics and of the kinetic theory are applied in a study of the properties of gases, liquids and solids, thermochemistry, properties of solutions, and equilibrium in homogeneous and heterogeneous systems. Chemical kinetics and atomic and molecular structure are also studied.

INTRODUCTORY PHYSICAL LABORATORY. (Arts and Sciences; Chemistry 411-412.) Throughout the year. Credit two hours a term. Prerequisite or parallel course, Chemistry 403-404 or 407-408. Chemistry 411 is prerequisite to Chemistry 412. Enrollment may be limited. Required of candidates for the degree of B.Ch.E. and A.B. with a major in chemistry. Laboratory, M T or Th F 2-4:30. Professor HOARD, Assistant Professor SCHERAGA, and assistants.

Quantitative experiments illustrating the principles of physical chemistry, and practice in performing typical physicochemical measurements. A part of the scheduled time is used for the discussion of experiments rather than for laboratory work.

COLLOID CHEMISTRY. (Arts and Sciences; Chemistry 440.) Spring. Credit two hours. Prerequisite, Chemistry 404 or 408. Lectures, T Th 11. Assistant Professor SCHERAGA.

Physical chemistry of surfaces and colloids, including electrokinetic phenomena, stability, and properties of various types of colloidal systems. Given in alternate years.

PHYSICS FOR STUDENTS OF BIOLOGY. (Arts and Sciences; Physics 200.) Either term. Credit three hours. Prerequisite, six semester hours of college work in each of the following: physics, chemistry, and biological science. Students having grades below 70 in Physics 103 and 104 are not encouraged to elect this course. Lectures, T Th 12. Laboratory, T or Th 2-4. Professor BARNES.

Lectures, demonstrations, and laboratory experiments dealing with such topics in molecular physics, electricity and magnetism, electromagnetic radiation, and nuclear physics as are related to the study of biology.

ECONOMICS

FOOD ECONOMICS. (Agriculture; Agricultural Economics 160.) Spring. Credit three hours. Designed especially for students in the School of Nutrition and in the College of Home Economics. Not open to students in the College of Agriculture except by permission of the instructor. Lectures and discussion, M W F 8. Savage 100. Professor DeGRAFF.

Economic aspects of food, including production, distribution, and consumption, with special emphasis on the economics of diet.

MARKETING. (Agriculture; Agricultural Economics 140.) Spring. Credit three hours. Lectures, M W F 11, except for weeks when field trips are taken, then M F 11. Warren 45. Field trips begin after spring recess, T W or Th 1:30-5:30. Professor DARRAH.

A study of how farm products are marketed. Special attention is given to the consumption of farm products, the factors that affect consumption, production areas, market channels, the operation of different marketing agencies, marketing services, and costs. One all-day and five half-day trips are taken to visit farms and marketing agencies.

SURVEY OF INDUSTRIAL AND LABOR RELATIONS. (Industrial and Labor Relations 293.) Fall and spring. Credit three hours.

A survey for students in other divisions of the University. The course will include an analysis of the major problems in industrial and labor relations; labor union history, organization, and operation; labor market analysis and employment practices; industrial and labor legislation and social security; personnel management and human relations in industry; collective bargaining; mediation and arbitration; the rights and responsibilities of employers and employees; the major governmental agencies concerned with industrial and labor relations.

INSTITUTION ORGANIZATION AND ADMINISTRATION. (Home Economics; Institution Management 320.) Fall. Credit three hours. Primarily for seniors. Advised for all students specializing in institution management or dietetics. Prerequisites, Institution Management 230 and Accounting 240. Hotel Administration 119 or Industrial and Labor Relations 461 is recommended to precede or parallel this course. Registration with permission. M 2-4, F 2. Van Rensselaer 124. Professor HARRIS.

Analysis and interpretation of major administrative problems such as the operational plan of a food service organization, policies underlying the plan, financial management, some phases of employment management, planning of efficient kitchens, and selection of equipment. A one- or two-day trip to Syracuse or Rochester to visit various types of institutions will be included. Estimated cost of trip, \$6 to \$12.

INDUSTRIAL ORGANIZATION AND MANAGEMENT. (Mechanical Engineering 3235.) Fall or spring. Credit three hours. Three lectures a week.

An introductory course in the field of industrial management. The industrial revolution, the principles of mass production, types of business enterprises, and the location and growth of industry. The organization of the plant facilities and the plant personnel with special emphasis on the layout of the plant, types of organizational control, production control, personnel functions, motion and time study, and wage payment systems. This course differs from Mechanical Engineering 3236 in that it includes a discussion of types of business enterprises and the major functions of the personnel department and covers wage systems in more detail. It does not go into as much detail on production control and does not include any discussion of cost and budgeting problems.

PERSONNEL MANAGEMENT. (Mechanical Engineering 3232.) Fall or spring. Credit three hours. Three lectures a week. Prerequisites, Mechanical Engineering 3235 and 3241 or consent of the instructor, junior standing.

This course involves an investigation and evaluation of the techniques used in the handling of personnel functions. The major topics are selection and evaluation of the employee, job analysis, job rating, training, and motivation as well as the organization of the personnel department and its relationship to other departments in an industrial organization.

MATHEMATICS

ANALYTICAL GEOMETRY AND CALCULUS. (Arts and Sciences; Mathematics 161.) Fall and spring. Credit three hours. Prerequisite, trigonometry and intermediate algebra. Hours to be arranged.

Plane analytic geometry through conics. Differentiation and integration of polynomials with applications to rates, maxima, volumes, pressures, etc.

Courses 161-162-163 represent a standard three-term calculus sequence, presenting the main ideas and techniques of the calculus and analytic geometry; the material is so arranged that the first two terms (161-162) provide a reasonably complete introduction to the subject. This sequence of courses is not intended as preparatory to more advanced courses in mathematics, although admission to such courses, following this sequence, can be obtained by special permission. (For students who took the 161-162-163 sequence when it was the only one offered, this will continue to serve as the prerequisite to advanced work.) Students majoring in mathematics or in those physical sciences where mathematics is extensively used or who have special mathematical competence should elect the 181-182-183 sequence instead.

ANALYTIC GEOMETRY AND CALCULUS. (Arts and Sciences; Mathematics 162.) Fall and spring. Credit three hours. Prerequisite, Mathematics 161. Hours to be arranged.

Differentiation and integration of algebraic, trigonometric, logarithmic, and exponential functions, with applications. Related topics, including polar coordinates, parametric equations, and vectors.

ANALYTIC GEOMETRY AND CALCULUS. (Arts and Sciences; Mathematics 163.) Fall and spring. Credit three hours. Prerequisite, Mathematics 162. Hours to be arranged.

Infinite series, solid analytic geometry, partial derivatives, and multiple integrals.

STATISTICAL METHODS I. (Agriculture; Plant Breeding 210.) Fall. Credit three or four hours. Prerequisite, graduate standing or permission of instructor. Lectures, T Th S 10. Warren 45. Laboratory to be arranged. Associate Professor STEEL.

A simple formalization of everyday notions of odds and probability leads to a discussion of the distributions commonly encountered in the statistics applied to

biology and related fields. The results, together with principles of scientific experimentation and statistical method, are applied to the conducting of experiments and the interpretation of results. The nature and validity of experimental error are thoroughly treated. Topics include analysis of variance for n -way classifications, tests of hypotheses, linear regression, correlation, treatment of discrete data, and sample surveys.

STATISTICAL METHODS II. (Agriculture; Plant Breeding 211.) Spring. Credit three or four hours. Prerequisite, Plant Breeding 210 or the equivalent. Lectures, T Th S 10. Warren 245. Laboratory, to be arranged. Associate Professor STEEL.

The work of Plant Breeding 210 is continued. Further application of the material includes randomized block and Latin square designs, analysis of covariance, analysis of variance of two-way classifications with disproportionate numbers, factorial experiments, individual degrees of freedom, multiple and curvilinear regression, curve fitting, and new developments in statistics.

ECONOMIC AND SOCIAL STATISTICS. (Industrial and Labor Relations 510.) Fall and spring. Credit three hours.

A nonmathematical course for graduate students in the social studies without previous training in statistical method. Emphasis will be placed on discussion of technical aspects of statistical analysis and on initiative in selecting and applying statistical methods to research problems. The subjects ordinarily covered will include analysis of frequency distribution, time series (including index numbers), regression and correlation analysis, and selected topics from the area of statistical inference.

PRINCIPLES OF INDUSTRIAL ACCOUNTING AND COST FINDING. (Engineering 3231.) Fall or spring. Credit three hours. Two recitations and one computing period a week.

A basic course in the principles of industrial accounting including controlling accounts, special journals and ledgers, voucher system, and manufacturing cost systems.

PHYSIOLOGY AND HISTOLOGY

PHYSIOLOGY. (Veterinary; Physiology 12.) Spring. Credit three hours. M W F 8. Professor DUKES.

Lectures and demonstrations on blood and lymph, circulation, respiration, digestion, and absorption. The action of drugs (pharmacodynamics) will be considered where possible.

PHYSIOLOGY. (Veterinary; Physiology 13.) Fall. Credit three hours. M T W 9. Professors DUKES, DYE, and DOUGHERTY.

Lectures and demonstrations on the muscular and nervous systems, senses, excretion, metabolism, heat regulation, endocrine organs, and reproduction. The action of drugs will receive attention where possible.

EXPERIMENTAL PHYSIOLOGY. (Veterinary; Physiology 14.) Fall. Credit three hours. For nonveterinary students registration is by permission. Laboratory, M 10-12:30, F 8-1; or W 10-12:30, S 8-1. Professors DOUGHERTY, NANGERONI and assistants.

Special emphasis is placed on mammalian physiology. A part of the course is devoted to pharmacodynamics.

ADVANCED EXPERIMENTAL PHYSIOLOGY. (Veterinary; Physiology 16.) Spring. Credit two hours. Prerequisites, Physiology 12 or 13 or its equivalent, and Physiology 14 or its equivalent. Registration by permission. Laboratory F 9-1. Professors DUKES, DYE, and NANGERONI.

COMPARATIVE PHYSIOLOGY. (Arts and Sciences; Zoology 451.) Fall. Credit three hours. Prerequisites, one year of biology or zoology and college

courses in chemistry. Organic chemistry and comparative anatomy are also desirable. Lectures W F 9. Laboratory, T W Th or F 1:40-4:40. Professor SCHNEIDERMAN.

The principal physiological functions of both vertebrates and invertebrates, including muscle contraction, nerve action, respiration, metabolism, digestion, circulation, excretion, and physiological regulation.

GENERAL AND CELLULAR PHYSIOLOGY. (Arts and Sciences; Zoology 452.) Spring. Credit three hours. Prerequisites, animal or plant physiology, organic chemistry, physics, and permission of the instructor. Biochemistry and histology or cytology are also desirable. Lecture and seminar hour to be arranged. Laboratory, T W or T Th 1:40-5. Professor SCHNEIDERMAN.

An introduction to basic problems and methods of cellular physiology including physicochemical properties of protoplasm, permeability, active transport, growth, respiration, and metabolism. The laboratory is designed to familiarize the student with basic techniques currently employed in physiological investigations, notably manometric and spectrophotometric methods, radioactive tracer technique, isolation of intracellular components, identification of enzyme systems, use of ultra-violet and x-irradiation, tissue culture.

ELEMENTARY ENDOCRINOLOGY. (Agriculture; Animal Husbandry 127.) Fall. Credit two hours. T Th 10. Wing C. Associate Professor HANSEL.

A general course in the physiology of the endocrine system. Lectures and demonstrations showing the effects of the hormones of the endocrine glands and the roles played by each in the regulation of normal body processes.

PHYSIOLOGY OF REPRODUCTION. (Agriculture; Animal Husbandry 125.) Spring. Credit three hours. Open to graduate students and upperclassmen. Prerequisite, Animal Husbandry 127 or the equivalent. Lectures, M W 10. Wing C. Laboratory, T 2-4:30. Wing C. Professor ASDELL, Associate Professor HANSEL, and assistants.

An advanced course in reproduction, principally in mammals. The laboratory work consists of a series of small projects designed to illustrate modern large animal breeding techniques and the effects of the major hormones of reproduction and lactation.

ENDOCRINOLOGY AND METABOLISM. (Veterinary; Physiology 305.) Fall. Credit three hours. Prerequisites, six or more hours of biology, and a previous or parallel course in organic chemistry. Open to upperclassmen and graduate students. M W F 8. Professor DYE.

A study of intermediary metabolism, endocrinology, and reproduction. Illustrated lectures.

HISTOLOGY: THE BIOLOGY AND DEVELOPMENT OF THE TISSUES. (Arts and Sciences; Zoology 301.) Fall. Credit four hours. Prerequisites, Zoology 101-102, or 103-104, and 211-212. Lectures, T Th 11. Laboratory, T Th 8-10:30 or 2-4:30. Professor WIMSATT and assistants.

A general survey of the structure and development of the tissues. The treatment is general, designed to provide students of biology with a basis for the understanding of normal and abnormal structure of the vertebrates. Each student will make for his own use a series of typical microscopic preparations.

SPECIAL HISTOLOGY: THE BIOLOGY OF THE ORGANS. (Arts and Sciences; Zoology 302.) Spring. Credit four hours. Prerequisite, Zoology 301. Enrollment limited to 25 students. Lectures, W F 9. Laboratory, W F 2-4:30. Professor WIMSATT and assistants.

A continuation of Zoology 301. Zoology 301 and 302 together give the fundamental facts of the microscopic structure and development of the body. There is also offered opportunity to gain knowledge of technique in the fixing, embedding, and sectioning of selected organs.

SOCIAL STUDIES

THE FIELD OF SOCIAL WORK. (Agriculture; Rural Sociology 124.) Fall. Credit three hours. Not open to freshmen or sophomores. Prerequisite, one course in sociology and one course in psychology. Lectures and discussions, M W F 9. Warren 232. Associate Professor TAIETZ.

This course considers the field of social work and its services designed to meet a wide range of human needs growing out of social, economic, and emotional maladjustments. An understanding of social work is developed through a study of the processes of social case work, social group work, and community organization. Consideration is given to social work as a career, the professional knowledge and skill necessary for the practice of social work, and how these can be acquired through training.

SOCIAL SERVICES TO INDIVIDUALS. (Agriculture; Rural Sociology 126.) Spring. Credit three hours. Prerequisite, Rural Sociology 124 or permission of instructor. M W 11-12:30. Warren 232. Associate Professor TAIETZ.

An analytical study of attitudes and behavior commonly encountered in helping people who have personal and social problems. A survey of social case-work methods, with particular emphasis on the technique of interviewing. Discussion of case material provided by the instructor and from the student's own experience.

DYNAMICS OF FAMILY INTERACTION. (Home Economics; Child Development and Family Relationships 461.) Spring. Credit three hours. T Th 11-12:30. Van Rensselaer 121. Professor ROCKWOOD.

This course deals with the functioning of the family unit within the framework of American culture. The emphasis is primarily upon the dynamic significance for the man and the woman, the adult and the child, of their different but related roles.

PSYCHODYNAMICS OF PERSONALITY. (Home Economics; Child Development and Family Relationships 360.) Fall. Credit three hours. Open to juniors and seniors; graduate students admitted by permission of the instructor. Limited to forty-five students. M W F 11. Van Rensselaer 124. Professor DALTON.

Psychological influence in the development and functioning of persons. Special attention will be given to basic determinants of personality; structure of the personality; personality in social and cultural context; the influence of conscious and unconscious processes in behavior.

RURAL COMMUNITY ORGANIZATION. (Agriculture; Rural Sociology 111.) Spring. Credit three hours. Prerequisite, Rural Sociology 1 or 12 or permission of the instructor. M W F 9. Warren 232. Associate Professor REEDER.

A consideration of the problems involved in helping people and organizations in a community work together to meet their common needs. Problems which arise in helping schools, churches, farm organizations, and civic groups in integrating themselves into the life of the community are one part of this consideration. Students are given the opportunity to practice some organization techniques which have been found successful in community organization work.

THE NATURE OF MAN: CULTURE AND PERSONALITY. (Arts and Sciences; Sociology and Anthropology 602.) Spring. Credit three hours. Prerequisites, at least two but preferably all three of the following courses: Zoology 201 (or equivalent), a course in psychology, a course in sociology and anthropology; or consent of instructor. M W F 10. Professors HOLMBERG, LAMBERT, BRONFENBRENNER, AND SINGER.

A study of facts and theories of personality development in our own and other cultures approached from the perspectives of psychology, social psychology, comparative cultural anthropology, and biology, with representatives of these approaches all participating. This course is part of a sequence on the nature of man, which includes Zoology 201 and Psychology 301.

NATIVE CULTURES OF THE NEW WORLD: NORTH AMERICA. (Arts

and Sciences; Sociology and Anthropology 603.) Fall. Credit three hours. M W F 2. Mr. SMITH.

A survey of the culture areas from the Eskimo to the Mexican. Topics include the peopling of North America, linguistic classification, cultural development, functional and historical analyses of selected groups.

NATIVE CULTURES OF THE OLD WORLD: SOUTHEAST ASIA. (Arts and Sciences; Sociology and Anthropology 606.) Fall. Credit two hours. Th 4-6. Professor SHARP.

A survey of representative cultures in the region from Assam and southern China through Indonesia. Topics include prehistory, description of selected groups, distribution of cultural types.

NATIVE CULTURES OF THE OLD WORLD: NORTHEAST ASIA. (Arts and Sciences; Sociology and Anthropology 608.) Spring. Credit two hours. T 4-6. Mr. SMITH.

A survey of representative cultures in central and northern Asia, including Turkestan, Tibet, Mongolia, Siberia, Korea, and Japan. Topics include prehistory, description of selected groups, distribution of cultural types.

SEMINAR: CASE STUDIES IN APPLIED ANTHROPOLOGY. (Arts and Sciences; Sociology and Anthropology 690.) Spring. Credit two hours. Prerequisite, consent of instructor. M 7:30-9:30 p.m. Mr. SMITH and STAFF.

Designed for advanced undergraduate or graduate students in engineering, agriculture, nutrition, and the social sciences who are concerned with the modernization of underdeveloped regions of the world. Analysis of selected cases relating to human problems resulting from technological or other cultural change.

RESEARCH

SPECIAL PROBLEM. (School of Nutrition 199.) Credit variable. Report on individual problem under direction of any member of the faculty of the School of Nutrition. See page 8 of this Announcement for details.